

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
 US Department of Commerce
 United States Patent and Trademark
 Office, PCT
 2011 South Clark Place Room
 CP2/5C24
 Arlington, VA 22202
 ETATS-UNIS D'AMERIQUE
 in its capacity as elected Office

Date of mailing (day/month/year) 05 June 2001 (05.06.01)	Applicant's or agent's file reference 2334388AD
International application No. PCT/AU00/01062	Priority date (day/month/year) 07 September 1999 (07.09.99)
International filing date (day/month/year) 07 September 2000 (07.09.00)	
Applicant STEVENS, David, J	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
04 April 2001 (04.04.01)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Charlotte ENGER Telephone No.: (41-22) 338.83.38
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PATENT COOPERATION TREATY
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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

RECD 13 SEP 2001

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(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 2334388/AXD/PSC	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).
International Application No. PCT/AU00/01062	International Filing Date (<i>day/month/year</i>) 7 September 2000	Priority Date (<i>day/month/year</i>) 7 September 1999
International Patent Classification (IPC) or national classification and IPC Int. Cl. ⁷ B65B 9/06		
Applicant CRYOVAC AUSTRALIA PTY LTD et al		

1.	This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.	
2.	This REPORT consists of a total of 3 sheets, including this cover sheet. <input type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT). These annexes consist of a total of sheet(s).	
3.	This report contains indications relating to the following items: I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input type="checkbox"/> Certain defects in the international application VIII <input type="checkbox"/> Certain observations on the international application	

Date of submission of the demand 4 April 2001	Date of completion of the report 4 September 2001
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer JAGDISH WABLE Telephone No. (02) 6283 2638

I. Basis of the report**1. With regard to the elements of the international application:***

- ☒ the international application as originally filed.
- ☐ the description, pages , as originally filed,
 pages , filed with the demand,
 pages , received on with the letter of
- ☐ the claims, pages , as originally filed,
 pages , as amended (together with any statement) under Article 19,
 pages , filed with the demand,
 pages , received on with the letter of
- ☐ the drawings, pages , as originally filed,
 pages , filed with the demand,
 pages , received on with the letter of
- ☐ the sequence listing part of the description:
 pages , as originally filed
 pages , filed with the demand
 pages , received on with the letter of

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/fig.

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims 1-15	YES
	Claims	NO
Inventive step (IS)	Claims	YES
	Claims 1-15	NO
Industrial applicability (IA)	Claims 1-15	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)**NOVELTY (N) Claims 1-15**

The claimed invention is considered to be novel in the light of prior art.

INVENTIVE STEP (IS) Claims 1-15

a) US 4288965 A

b) US 4840012 A

c) US 4627221 A

d) US 4813208 A

These citations do not individually disclose all of the features of the invention but when combined, as would be obvious to a person skilled in the art, disclose all of the features of the claims. For example citations (c) and (d) disclose in figures 3 and 2 respectively a method of slitting and unfolding a tubing while citations (a) and (b) both disclose in figure 1 the step of forming the flat web around the product, longitudinally sealing the packaged material, cutting and sealing the product at one or both ends.

PATENT COOPERATION TREATY

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 2334388	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. PCT/AU00/01062	International filing date (day/month/year) 7 September 2000	(Earliest) Priority Date (day/month/year) 7 September 1999
Applicant CRYOVAC AUSTRALIA PTY LTD et al		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 5 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

- a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (See Box II).

4. With regard to the title, ☒ the text is approved as submitted by the applicant.
☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract, ☐ the text is approved as submitted by the applicant

☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No. 1.2

☒ as suggested by the applicant.

☐ None of the figures

☐ because the applicant failed to suggest a figure

☐ because this figure better characterizes the invention

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

A method of packaging comprising the step of:

- (i) continuously feeding a packaging material (J) as tubing from a supply (K);
- (ii) slitting and unfolding said tubing to form a web of said packaging material (J);
- (iii) forming said flat web of packaging material (J) around a fed product (D) and longitudinally sealing (G) the packaging material (J) formed around the product (D); and
- (iv) cutting and sealing (A) the packaging material (J) at one or both ends of the product (D).

A. CLASSIFICATION OF SUBJECT MATTERInt. Cl. ⁷: B65B 9/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHEDMinimum documentation searched (classification system followed by classification symbols)
IPC: B65B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPAT: IPC: as above, Keywords: form (and similar terms); tube (and similar terms); slit (and similar terms); sever (and similar terms); unfold (and similar terms); surround (and similar terms)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4288965 A (JAMES) 15 September 1981 Whole document	1-15
Y	US 4840012 A (BOECKMANN) 20 June 1989 Whole document	1-15
Y	US 4627221 A (BUCHNER) 9 December 1986 Whole document	1-15

☒ Further documents are listed in the continuation of Box C ☒ See patent family annex*** Special categories of cited documents:**

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

3 November 2000

Date of mailing of the international search report

14 NOV 2000

Name and mailing address of the ISA/AU

AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
E-mail address: pct@ipaustalia.gov.au
Facsimile No. (02) 6285 3929

Authorized officer

JAGDISH WABLE
Telephone No : (02) 6283 2638

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4813208 A (PILTZ ET AL) 21 March 1989 Whole document	1-15

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
US	4288965	AU	61686/80	BE	884883	BR	8005338
		CA	1139211	CH	650461	DE	3031399
		DK	3582/80	ES	494496	ES	8105216
		FI	802707	FR	2464191	GB	2056940
		IT	1132487	JP	56032203	MX	153425
		NL	8004623	SE	8005899	SG	659/84
		SU	1431669	ZA	8005150		
US	4840012	AU	25844/88	CA	1330753	EP	319995
		JP	1167007	US	4869048	CA	1281628
		DE	3810554	GB	2206556	US	4790126
US	4627221	DE	3439020	EP	181466	JP	61104931
US	4813208	EP	252040	JP	63003938	SE	8602484
		SE	8602561				
END OF ANNEX							

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PQ 2682 7 September 1999 (07.09.1999) AU

(71) Applicant (for all designated States except US): **CRY-
OVAC AUSTRALIA PTY LTD [AU/AU]; 1126 Sydney
Road, Fawkner, Victoria 3060 (AU).**

(72) Inventor; and

(75) Inventor/Applicant (for US only): **STEVENS, David, J
[AU/AU]; 97 Station Street, Port Melbourne, Victoria 3207
(AU).**

(74) Agents: **DARK, Andrew, David et al.; Davies Collison
Cave, 1 Little Collins Street, Melbourne, Victoria 3000
(AU).**

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DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR,
HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR,
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NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM,
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IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG,
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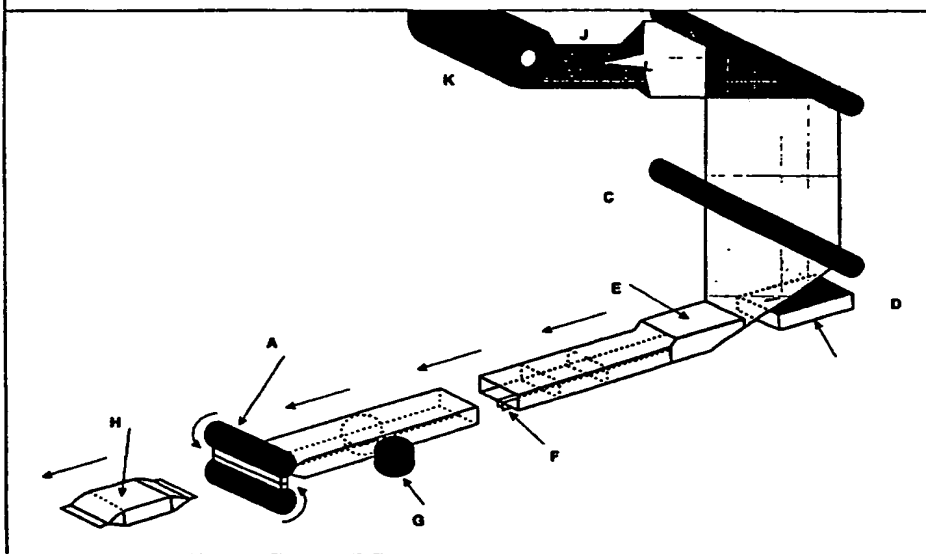
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For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: **METHOD FOR PACKAGING AND PACKAGING APPARATUS**

**Diagram 1.2. Described device using Tubing material feeding a Form Fill and Seal
Packaging Machine.**



(57) Abstract: A method of packaging comprising the steps of: (i) continuously feeding a packaging material (J) as tubing from a supply (K); (ii) slitting and unfolding said tubing to form a web of said packaging material (J); (iii) forming said flat web of packaging material (J) around a fed product (D) and longitudinally sealing (G) the packaging material (J) formed around the product (D); and (iv) cutting and sealing (A) the packaging material (J) at one or both ends of the product (D).



WO 01/17853 A1

METHOD FOR PACKAGING AND PACKAGING APPARATUS

The present invention relates to a method for packaging and a packaging apparatus for the packaging of, for example, food such as meat products. In particular, the invention
5 relates to a method of packaging and an apparatus which utilize a feed of packaging material in tubing form which is slit and unfolded to be formed around a fed product.

Methods and apparatus for the packaging of products, for example, food and in particular meat products, are broad ranging, various techniques being employed depending on the product which is to be packaged and the packaging material which is being used.
10 Generally, conventional form, fill and seal packaging machines and processes involve the supply of packaging material in continuous sheet form, commonly referred to as single wound material. The sheet material is supplied having a width as required for the wrapping process in question. Generally, the width of the sheet material is up to about 700 mm. The sheet material may be produced in various ways including using extrusion techniques, or via the
15 production of a tube of the material which is subsequently collapsed and slit to provide two flat sheets. These two methods have been traditionally used to supply sheet material for use in conventional form, fill and seal packaging practices.

The use of some types of plastic packaging materials may be somewhat limited when produced by conventional production methods due to limitations in the maximum possible
20 widths of the flat sheets produced using these methods. In particular, materials which are necessarily extruded and blown into a vertical bubble to induce shrink characteristics generally suffer from pore bubble stability. That is, when the material in a semi-molten phase is inflated to a wider tube before the plastic sets, if the bubble is not stable due to the plastic properties and size of the bubble, then it may collapse ceasing production of the
25 packaging material. Furthermore, and related to this, the accuracy and tolerances of the final packaging materials produced may be greatly affected using conventional production methods for flat sheet materials. More particularly, conventional processes of edge slitting the material to form two continuous flat sheets from a tube will produce flat sheets with variable width, the edges of which deviate quite markedly from a straight line.

30 The present invention advantageously provides a means for alleviating problems

related to variation in width of a single wound packaging material. The invention also advantageously provides a method and apparatus which may be economically viable in reducing production costs for the packaging material being used, and allows packaging materials to be run at widths which are not conventionally available. Still further, the invention advantageously provides a method and apparatus which may substantially avoid contamination of the product-contact surface of the packaging material prior to and during packaging of the product.

According to the present invention there is provided a method for packaging comprising the steps of:

- 10 (i) continuously feeding a packaging material as tubing from a supply;
- (ii) slitting and unfolding the tubing to form a flat web of the packaging material;
- (iii) forming the flat web of packaging material around a fed product and longitudinally sealing the packaging material formed around the product; and
- 15 (iv) cutting and sealing the packaging material at one or both ends of the product.

The fed product is, in accordance with conventional methods, generally fed as individual, spaced units of product, the flat web of packaging material being formed around each of the units. Subsequently, in step (iv) the packaging material which is formed and sealed around the product is cut at a location between units of product and sealed at one or both ends of the unit. In some instances it will be preferable that the packaging material be sealed at only one end so that the product is left in an open-ended bag. This will enable, if necessary, the subsequent vacuum sealing of the product in the bag. As such, in a particular embodiment, in step (iv) the packaging material is cut and sealed at one end of the product and the packaged product is subsequently vacuum sealed.

The method according to the invention utilizes a feed of packaging material in the form of tubing. This is quite different from the conventional form, fill and seal techniques which involve the supply of a flat single wound sheet of material which generally has been produced by edge slitting of a tube of material to form two flat sheets. In accordance with the method of the invention, as the packaging material is fed in tubing form and then slit and

opened out, it will be recognised that the width of the opened tubing, that is the flat web referred to in step (ii), will be twice that of conventionally used single wound material when that material has been produced by slitting of a tube to form two flat sheets. As such, according to the invention, if tubing is supplied having a double web width of up to about 550 mm, then the flat web formed by slitting and unfolding of the tubing will have a width of up to about 1100 mm. Such widths have generally been unavailable to date and, as will be recognised by those in the art, provide substantial advantages in the packaging of larger products.

The feeding of the packaging material in tubing form also removes costs related to the post-production conversion of conventional materials to flat continuous sheeting, for example, the edge slitting of a tube to form two flat sheets described above. The supply of tubing also means that the packaging material is not opened to the air prior to the slitting and unfolding of the tubing in step (ii) of the method. This fact substantially decreases the chance of contamination to the inner surface of the film which will form the inside or product-contacting surface of the packaging material.

In order to minimise variation in width of the flat web formed in step (ii), in a preferred embodiment during feeding of the tubing, the tubing is tracked to ensure that it is substantially centrally slit along its length. More particularly, the tubing is advantageously centrally slit along its upper or lower surfaces as illustrated in Diagram 2.2, although it may be possible to slit the tubing material along one of its edges to form the flat web as illustrated in Diagram 2.1.

After the slitting and unfolding of the tubing to form the flat web, the flat web of packaging material is formed around the product which is to be packaged and is longitudinally sealed to substantially reform the tubing originally fed from the supply. Due to the deviation in width of the flat web, on longitudinal sealing to reform the tubing, it will be recognised that there will be at least some excess packaging material along the longitudinal seal. Therefore, in a preferred embodiment, prior to or during the longitudinal sealing of the packaging material in step (iii), the packaging material is trimmed along its slit edges formed in step (ii) to remove excess packaging material therefrom. This trimming of the edge of the film is completed by a knife or shearing apparatus. The trimming function allows control of

the amount of excess material outside the longitudinal seal as illustrated in Diagram 3.1.

The cutting and sealing of the packaging material in step (iv), as discussed above, may include cutting and sealing at one end of the product and cutting and optionally sealing at the other end of the product depending on whether vacuum sealing of the packaged product is
5 desirable. The cutting and sealing may be conducted by any suitable method, such as using conventional hot or cold sealing systems. According to one embodiment, the cutting and sealing of the packaging material is carried out by impulse sealing the packaging material at the end or ends of the product.

Vacuum packaging of the product would commonly involve evacuating the bag
10 through the open end then sealing. The final package would contain no gas sealed inside with the packaged item. This could be completed by a vacuum nozzle or a vacuum chamber system. The final seal could be in the form of a clip or heat seal weld.

According to another aspect of the invention there is provided a packaging apparatus comprising:

- 15 means for receiving packaging material continuously fed as tubing from a supply, and slitting and unfolding the tubing to form a flat web of the packaging material;
calendering means for receiving the flat web and tensioning the flat web;
forming means for receiving the tensioned flat web and forming the flat web around a fed product;
20 sealing means for longitudinally sealing the packaging material formed around the product; and
end sealing means for cutting and sealing the packaging material at one or both ends of the product.

The slitting and unfolding means receives the continuous feed of packaging material
25 in tubing form and slits and unfolds the tubing to form the flat web of the packaging material for subsequent calendering and forming around a fed product.

The calendering means may include any means which is suitable for tensioning the flat web to supply the forming means. In a preferred embodiment, the calendering means comprises a pair of spring clamped rollers which are adapted to ensure that the flat web is fed
30 to the forming means at a consistent tension and angle. This calendering allows the apparatus

to be started and stopped during operation without the feed tension changing.

The forming means may comprise any suitable means for forming the flat web into a tubular shape around the fed product as will be understood by those skilled in the art. In a preferred embodiment, the forming means comprises a forming shoe which forms the flat
5 web around the fed product.

The sealing means for longitudinally sealing the packaging material formed around the product may include any suitable means for longitudinally sealing the packaging material to substantially reform the material into its original tubing form around the fed product. The longitudinal seal is typically formed by a combination of heat and pressure which cause the
10 two layers of material to weld or bond together. It is preferable that this joint is hermetic in nature. The heat and pressure are supplied typically by heated rollers with the film clamped therebetween. Variations of this include heated bands, drag wires, ultra sonic heating devices clamping the layers of plastic material and applying heat. An alternative method is to apply a cold bonding adhesive agent to both faces which may then bond to each other when pressure
15 is applied.

The end sealing means may comprise any suitable hot or cold sealing systems which employ adhesive and/or heat to facilitate sealing of the packaging material at one or both ends of the fed product. The configuration of the sealing means is selected to cut and seal the packaging material at one or both ends of the product and may be determined, as discussed
20 above, on the basis of whether subsequent vacuum sealing of the packaged product is desirable. That is, the end sealing means may be selected to provide a single seal adjacent a transverse cut in the packaging material or may be selected to provide a pair of seals which straddle a transverse cut in the packaging material. It will be recognised that the first of these options will produce an open bag containing the fed product. In a preferred embodiment,
25 the end sealing means comprises an impulse sealing device which includes at least two complimentary jaw members which clamp the packaging material to form a transverse cut in the packaging material, and which form a seal on one or both sides of the formed transverse cut.

As discussed above in relation to the method according to the invention, when the
30 apparatus is in use, the flat web formed by slitting and unfolding of the tubing of packaging

material will include some deviation in width. Therefore, in a preferred embodiment, the packaging apparatus preferably further comprises means for trimming excess packaging material from the flat web of packaging material to advantageously ensure that a longitudinal seal is formed along the length of the packaging material formed around the product which
5 is a neat fin seal.

The packaging apparatus also preferably further comprises means to facilitate center tracking of the tube to ensure that it is slit centrally along its length by the slitting and unfolding means.

In order to completely automate the packaging apparatus according to the invention,
10 it is preferred that the apparatus further comprise sensing means for auto-positioning of a product and successive products for end sealing. That is, preferably a sensing means is provided to sense when a product is in position for end sealing at which stage the conveyance of the product is stopped and an end seal formed or the sealing mechanism travels with the product forming a seal without halting the conveyance of the product. After completing the
15 transverse seal, the sealing mechanism travels in the reverse direction to prepare for the following seal. By controlling the spacing of the product with respect to each other, the package or bag length can be controlled. In a preferred embodiment, the sensing is generally completed by optical sensors which detect the leading and trailing edge of the products. This is the method used in determining spacing of respective products and the final position of the
20 transverse seal.

The invention will now be described in more detail with reference to the accompanying diagrams in which:

Diagram 1.1 illustrates a conventional form, fill and seal packaging apparatus;

Diagram 1.2 illustrates an embodiment of the form, fill and seal packaging apparatus
25 according to the invention;

Diagram 2.1 illustrates the slitting and unfolding of the fed tubing material by slitting one edge thereof;

Diagram 2.2 illustrates the slitting and unfolding of the tubing material by slitting centrally on one face thereof;

30 Diagram 3.1 illustrates the trimming of excess edge material;

Diagram 4.1 illustrates the configuration of the packaging apparatus of the invention;
and

Diagram 5.1 illustrates the transverse sealing sequence used in accordance with embodiments of the invention.

5 Referring to Diagram 1.1, a conventional form, fill and seal packaging apparatus feeds a single wound material from a roll (B). The film is unwound from the roll (B) and fed into the apparatus by a passive or powered unwind mechanism. Calendering of the unwound film is conducted in a calendering zone (C) where the material is adapted to ensure that it is supplied to the feed area of the apparatus at a consistent tension and angle.

10 Product to be packaged (D) is fed by a conveyor belt under the web of material to a forming device (E), commonly referred to as a forming box or forming shoe. The forming device (E) wraps the flat web of material around the incoming product (D) so that the flat web of material forms a tubular shape around the product. The material, when wrapped around the incoming product (D) may be folded in a manner which facilitates the production of a
15 longitudinal seal. This may be achieved, for example, by forming a fin (F) or a lap in the material.

After wrapping of the flat web of material around the incoming product (D), a longitudinal seal is made in the material by a longitudinal sealing device (G) to seal the two edges of the wrapped material together to form a complete tube.

20 When the complete tube is formed around the product, an end sealing device (A) is used to seal the tube and cut the tube between successive products (D) to form a finished packaged product (H).

As discussed earlier, these conventional form, fill and seal packaging apparatuses are limited due to the limitations in the maximum possible widths of the flat sheets fed from the
25 roll (B).

The invention, however, as illustrated in Diagram 1.2, feeds a tubing material (J) from a roll (K) of packaging material in an integral tubing form. In this case, the apparatus is provided with a slitting and unfolding device (L) which makes a continuous cut in the tubing material (J) and folds or forms the cut tubing material into a flat sheet. The slitting and
30 unfolding device uses a set of geometric plates and frames to ensure the alignment of the

material does not vary in the process.

As will be seen in Diagram 1.2, the following calendering of the slit and unfolded material is achieved by a pair of sprung clamped rollers in a calendering zone (C). The remaining packaging of the product (D) by a forming device (E), longitudinal sealing device 5 (G) and end sealing device (A) may be conducted in line with conventional methods.

Referring to Diagrams 2.1 and 2.2, the slitting and unfolding device generally comprises a back unfolding plate (1.1) and a front unfolding plate (1.2).

In Diagram 2.1, the tubing material is slit along one edge thereof by the slitting and unfolding device. In this regard, the raw tubing material (A) is fed into the device and slit 10 at an edge slitting point (B). Following slitting of the tubing material, the back layer (C) of the film folds to travel 90° from the original infeed path, and the front layer (D) of the film travels in a direct path. The back layer of the film travelling at 90° from the original infeed path (E) travels between the front unfolding plate (1.2) and the back unfolding plate (1.1) until it is folded to travel at 180° (F) from the original infeed path. Following this operation, 15 a final single web of film (G) exits the slitting and unfolding device at 180° from the original infeed path of the tubing material.

It should be noted that the angle (H) of the back and front unfolding plates (1.1, 1.2) are identical angles between 30° and 60° .

The slitting and unfolding device illustrated in diagram 2.2 utilizes the central slitting 20 of the tubing material (A).

In this case, a central slitting point (B) is provided on the back face of the tubing material (A). The back layer of the slit film (C) is then folded to travel at 90° from the original infeed path. The front layer (D) of the film travels in a direct path. As was the case in Diagram 2.1, the back layer of film travelling at 90° from the original infeed path (E) 25 passes between the front unfolding plate (1.2) and the back unfolding plate (1.1). The back layer of the film is then folded to travel at 180° (F) from the original infeed path. The final single web of film (G) exits the slitting and unfolding device at 180° from the original infeed path of the tubing (A).

As was the case in Diagram 2.1, the angles (H) provided by the plates are identical 30 angles between 30° and 60° .

Referring to Diagram 3.1, excess material (E) is advantageously trimmed from the packaging material at a point (C), and a longitudinal seal (D) applied to the trimmed material to complete the tube. This procedure advantageously removes inconsistent edges (B) of the packaging material generally present due to inconsistencies and variations during the
5 manufacture of the tubing material.

A further illustration of the packaging apparatus according to the invention is provided in Diagram 4.1. As illustrated in this diagram, the tubing material is unwound from a roll (B) and slit and unfolded using a slitting and unfolding device (C). The slit and unfolded material is then fed as a single web to a tensioning and feeding calender (D) and then onto
10 a forming or folding box (E). After forming or folding of the single web material by the forming or folding box (E) product (A) is fed into the formed material and an edged trimming device (F) used to trim the edges of the material. Following this, a longitudinal sealing device (G) is used to seal the material to form a complete tube. Scrap or edge trim material is removed by a suitable waste removal device (H).

15 Sealing of the formed tubing material about the product (A) is conducted by means of a pair of transverse sealing jaws (J) which are mounted for complementary movement towards each other. These jaws may either form a pair of transverse seals and cut the tubing material between the pair of seals, or may seal only one side of the tubing material and cut the material adjacent the seal. In the first case, the product (A) is completely enclosed as the
20 final package (L), whereas in the second instance the product (A) is conveyed out of the apparatus in an open bag as the final package (L).

In any event, the product (A) is conveyed by means of a main transport conveyor belt (K), and the packaging of the product (A) controlled by a machine control panel (M).

As previously discussed, the apparatus preferably includes sensors (not shown) which
25 determine the position of the product (A) relative to the sealing jaws (J) so as to determine operation of the sealing jaws (J) to seal between subsequent products (A).

The transverse sealing sequence is better illustrated in Diagram 5.1. The sequence includes the lowering of the jaws (A, B) toward the material (C) until the jaws are in a closed position. In this position, sealing means (D) on each jaw (A, B) form a pair of longitudinal
30 seals in the material (C). Simultaneously, a blade (E) forms a cut in the material between the pair of seals formed by the sealing means (D). The sealing means (D) may include

conventional means such as thermal bands.

Throughout this specification and the claims which follow, unless the context requires otherwise, the word "comprise", and variations such as "comprises" and "comprising", will be understood to imply the inclusion of a stated integer or group of integers or steps but not
5 the exclusion of any other integer or group of integers or steps.

Those skilled in the art will appreciate that the invention described herein is susceptible to variations and modifications other than those specifically described. It is to be understood that the invention includes all such variations and modifications. The invention also includes all of the steps, features, compositions and compounds referred to or indicated
10 in this specification, individually or collectively, and any and all combinations of any two or more of said steps or features.

CLAIMS

1. A method for packaging comprising the steps of:
 - (i) continuously feeding a packaging material as tubing from a supply;
 - (ii) slitting and unfolding said tubing to form a flat web of said packaging
5 material;
 - (iii) forming said flat web of packaging material around a fed product and longitudinally sealing the packaging material formed around the product; and
 - (iv) cutting and sealing the packaging material at one or both ends of the
product.
- 10 2. A method according to claim 1, wherein in step (iv) the packaging material is cut and sealed at one end of the product and the packaged product is subsequently vacuum sealed.
3. A method according to claim 1, wherein the tubing has a double web width of up to
15 about 550 mm.
4. A method according to claim 1, wherein during feeding the tubing is tracked to ensure that in step (ii) it is substantially centrally slit along its length.
- 20 5. A method according to claim 1, wherein prior to or during the longitudinal sealing of the packaging material in step (iii), the packaging material is trimmed along its slit edges formed in step (ii) to remove excess packaging material therefrom.
6. A method according to claim 1, wherein step (iv) is carried out by impulse sealing the
25 packaging material at the end or ends of the product.
7. A packaging apparatus comprising:
 - means for receiving packaging material continuously fed as tubing from a supply, and slitting and unfolding the tubing to form a flat web of the packaging material;
 - 30 calendering means for receiving the flat web and tensioning the flat web;

forming means for receiving the tensioned flat web and forming the flat web around a fed product;

sealing means for longitudinally sealing the packaging material formed around the product; and

5 end sealing means for cutting and sealing the packaging material at one or both ends of the product.

8. A packaging apparatus according to claim 7, wherein the calendering means comprises a pair of spaced rollers which are adapted to ensure that the flat web is fed to the forming means
10 at a consistent tension and angle.

9. A packaging apparatus according to claim 7, wherein the forming means comprises a forming shoe which forms the flat web into a tubular shape around the fed product.

15 10. A packaging apparatus according to claim 7, wherein the end sealing means comprising a hot or cold sealing system.

11. A packaging apparatus according to claim 10, wherein the end sealing means comprises an impulse sealing device which includes at least two complimentary jaw members which clamp
20 the packaging material to form a transverse cut in the packaging material, and which form a seal on one or both sides of the formed transverse cut.

12. A packaging apparatus according to claim 7, further comprising means for trimming excess packaging material from the flat web of packaging material.

25

13. A packaging apparatus according to claim 7, further comprising means to facilitate centre tracking of the tubing to ensure that it is slit centrally along its length by the slitting and unfolding means.

30

14. A packaging apparatus according to claim 13, wherein the means to facilitate centre tracking of the tubing includes one or more sensors.
15. A packaging apparatus according to claim 7, further comprising sensing means for auto-
5 positioning of a product for end sealing.

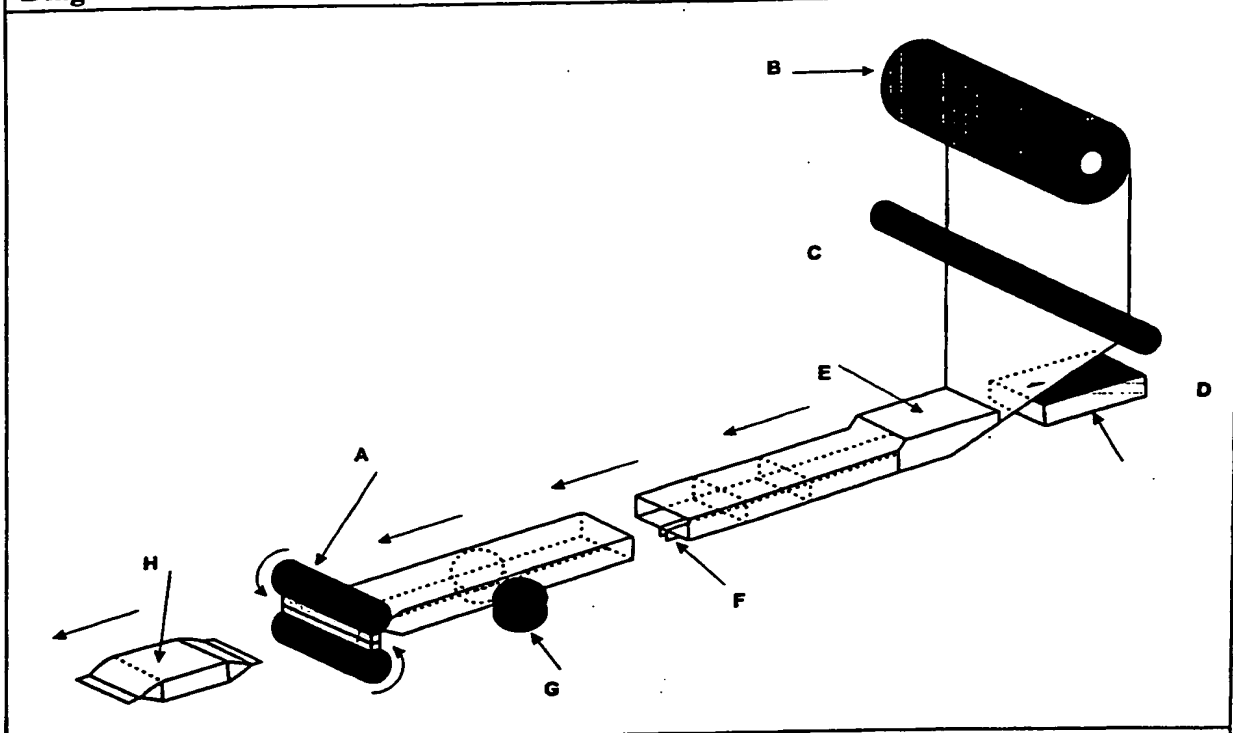
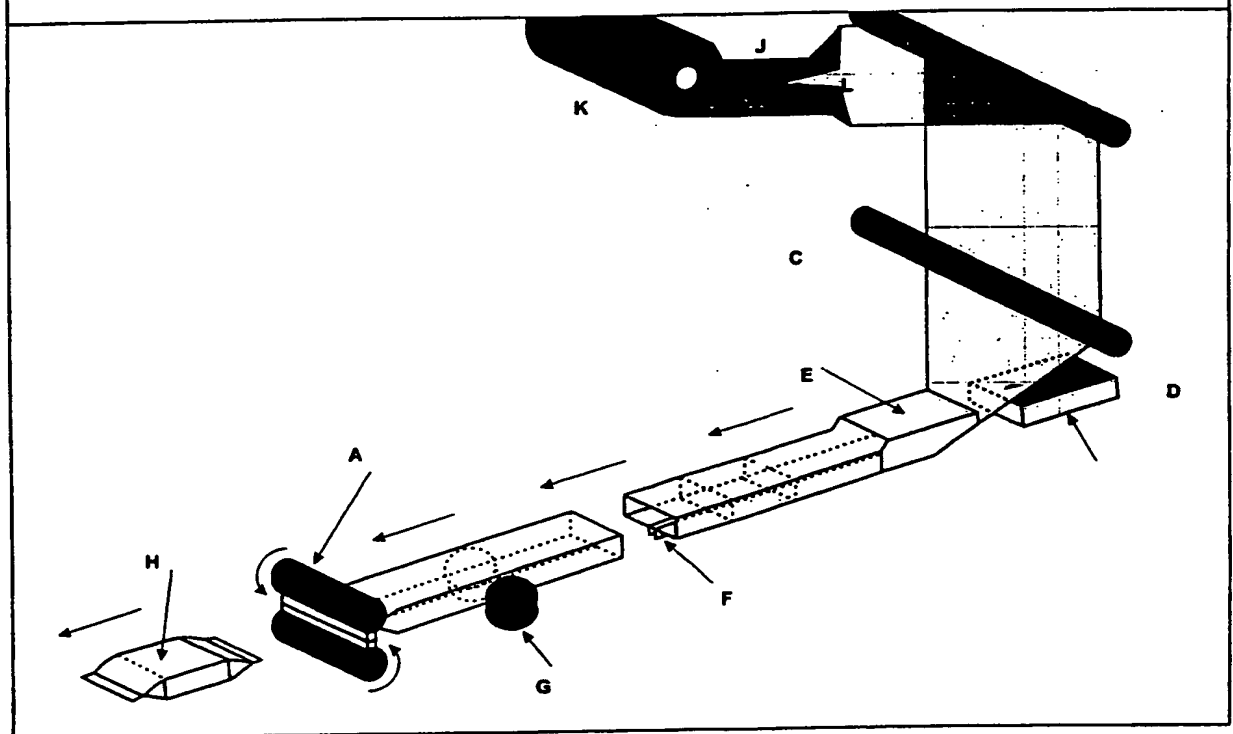
Diagram 1.1. Conventional Form, Fill and Seal Packaging Machine.**Diagram 1.2. Described device using Tubing material feeding a Form Fill and Seal Packaging Machine.**

Diagram 2.1 – Slitting and unfolding tubing material by slitting one edge.

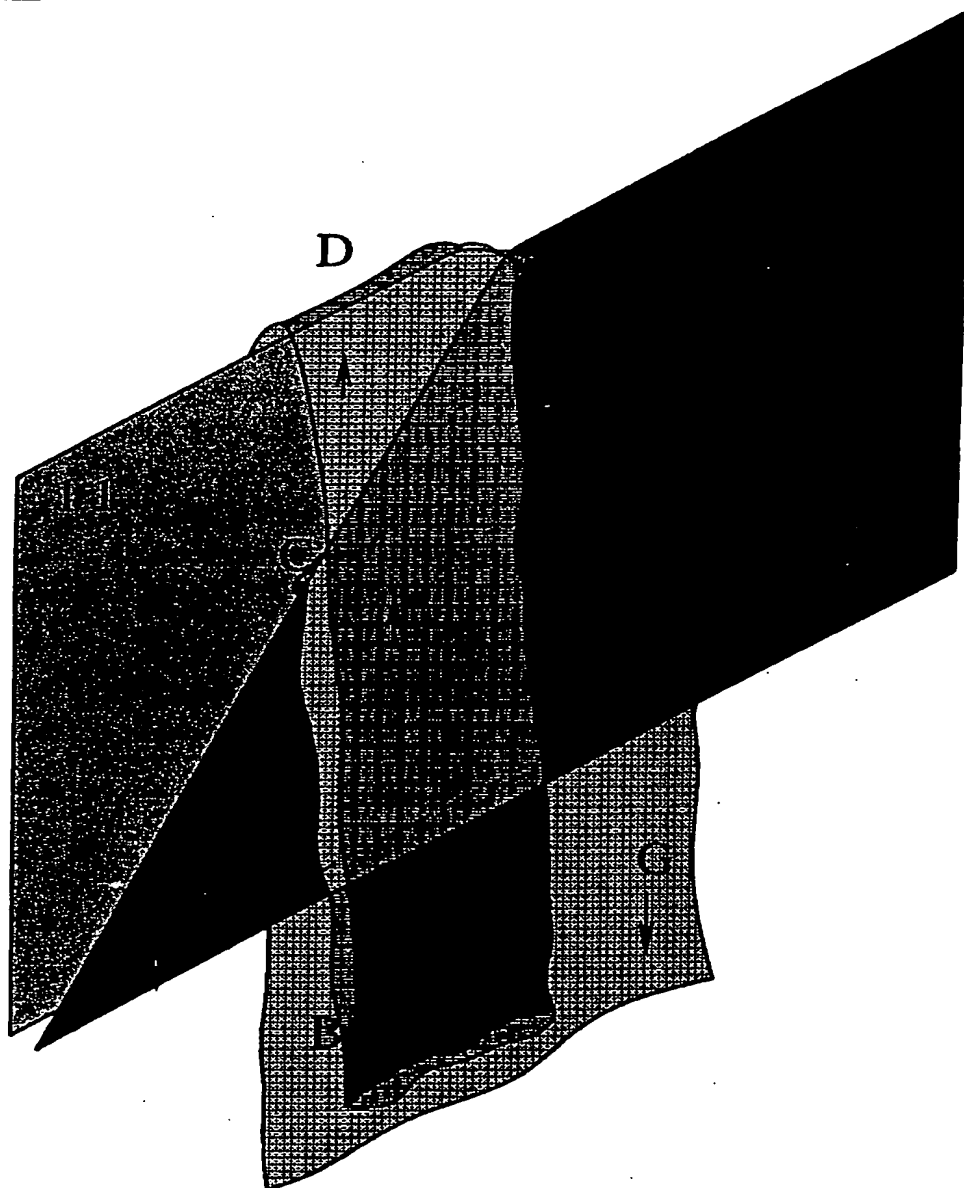


Diagram 2.2 – Slitting and unfolding tubing material by slitting centrally on one face.

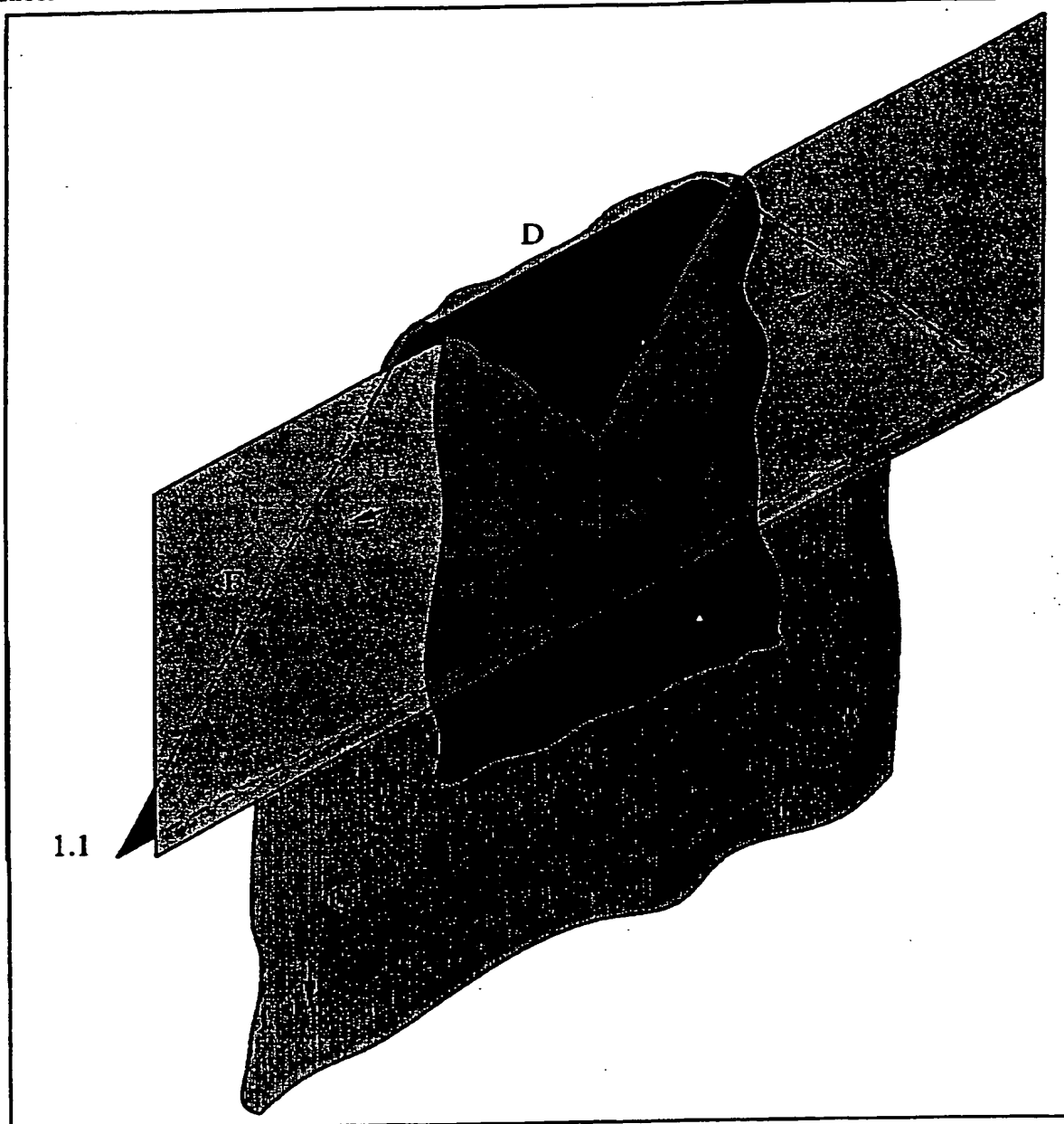
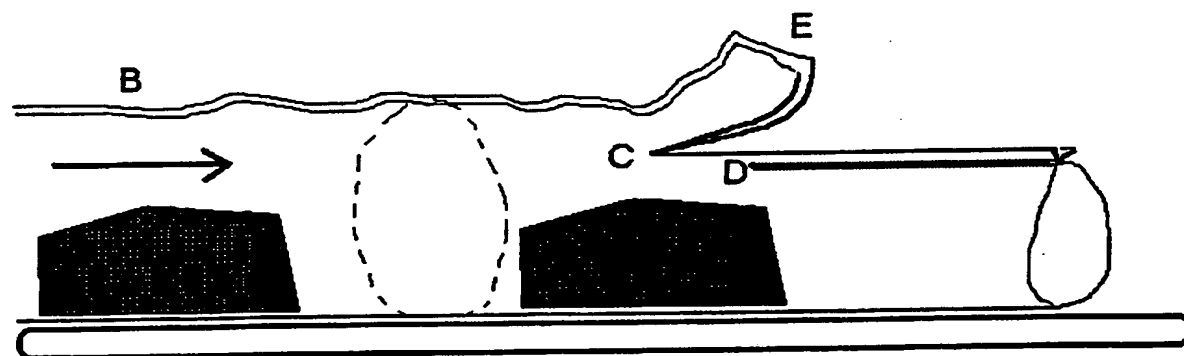
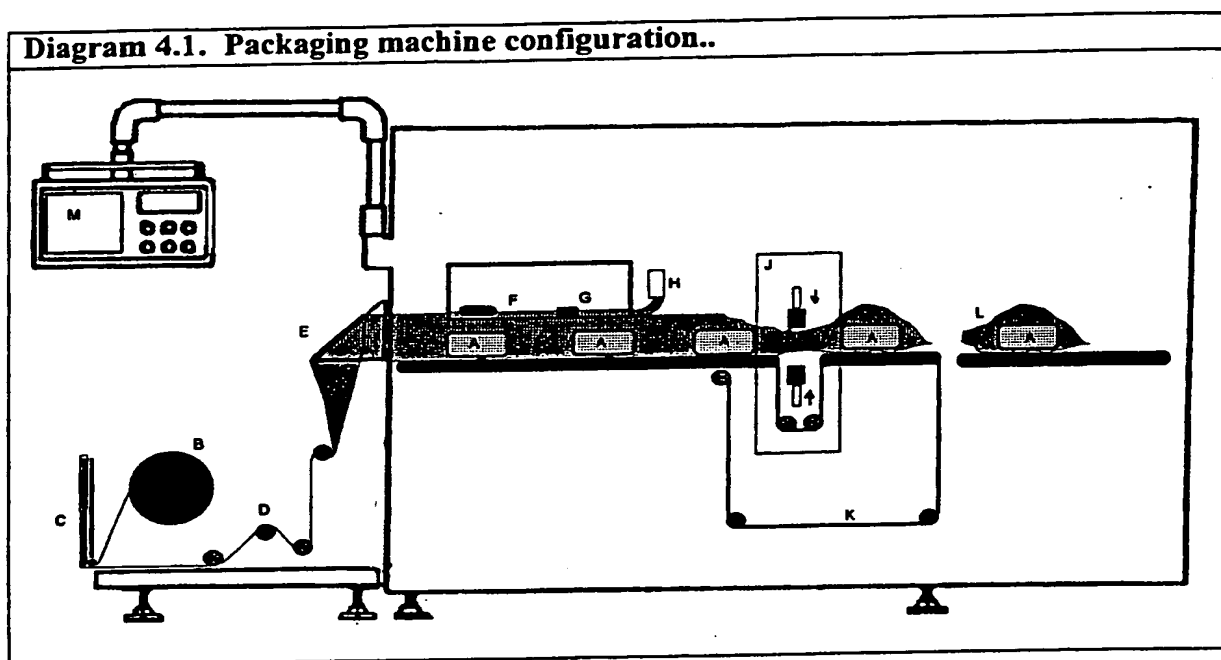


Diagram 3.1. Trimming excess edge material.

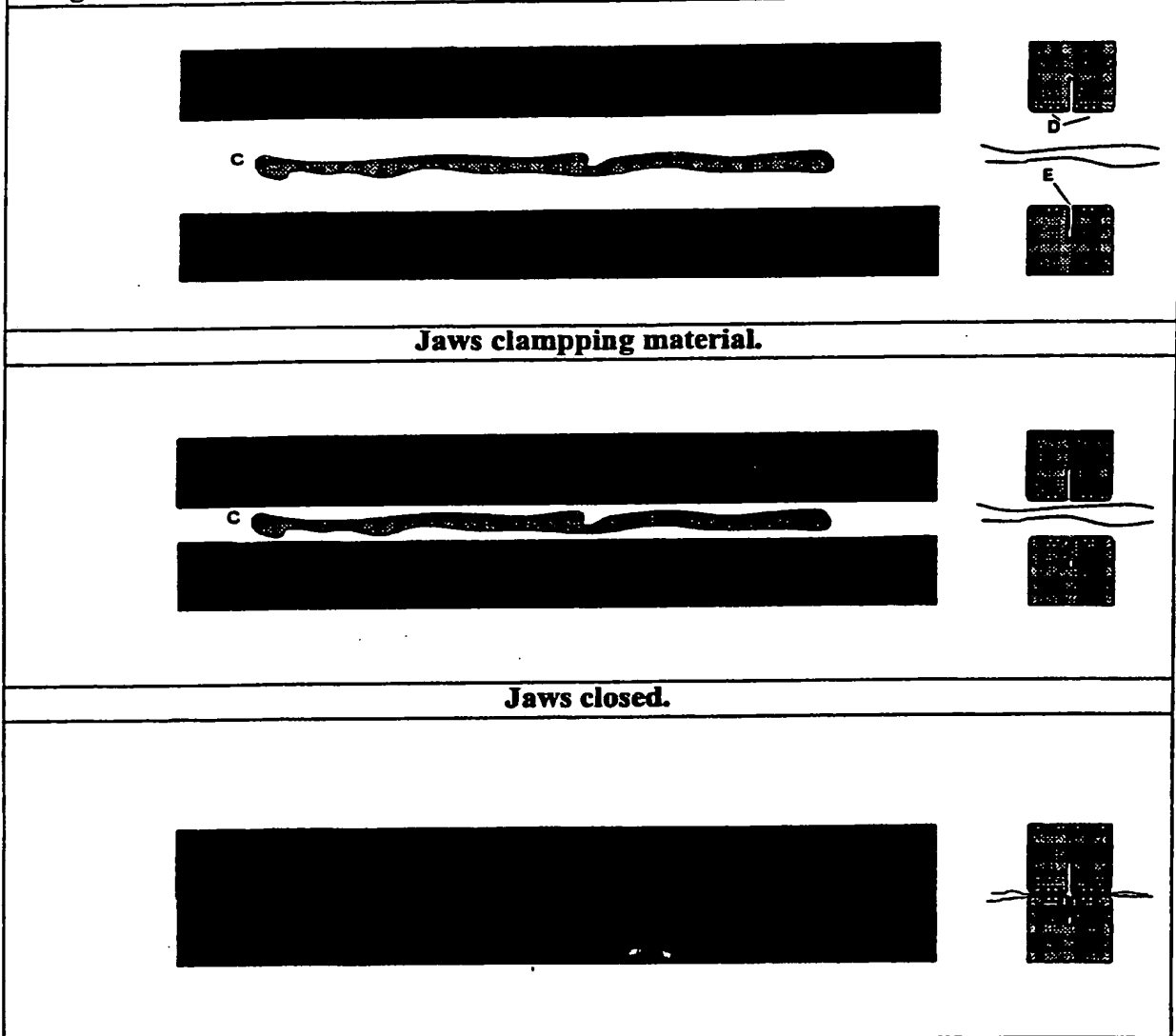
Diagram 3.1. Trimming excess edge material.



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Diagram 5.1. Transverse sealing sequence.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU00/01062**A. CLASSIFICATION OF SUBJECT MATTER**Int. Cl. ⁷: B65B 9/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHEDMinimum documentation searched (classification system followed by classification symbols)
IPC: B65B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WPAT: IPC: as above, Keywords: form (and similar terms); tube (and similar terms); slit (and similar terms); sever (and similar terms); unfold (and similar terms); surround (and similar terms)**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4288965 A (JAMES) 15 September 1981 Whole document	1-15
Y	US 4840012 A (BOECKMANN) 20 June 1989 Whole document	1-15
Y	US 4627221 A (BUCHNER) 9 December 1986 Whole document	1-15

☒ Further documents are listed in the continuation of Box C ☒ See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

3 November 2000

Date of mailing of the international search report

14 NOV 2000

Name and mailing address of the ISA/AU

AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
E-mail address: pct@ipaustralia.gov.au
Facsimile No. (02) 6285 3929

Authorized officer

JAGDISH WABLE
Telephone No : (02) 6283 2638

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU00/01062

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4813208 A (PILTZ ET AL) 21 March 1989 Whole document	1-15

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/AU00/01062

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
US	4288965	AU	61686/80	BE	884883	BR	8005338
		CA	1139211	CH	650461	DE	3031399
		DK	3582/80	ES	494496	ES	8105216
		FI	802707	FR	2464191	GB	2056940
		IT	1132487	JP	56032203	MX	153425
		NL	8004623	SE	8005899	SG	659/84
		SU	1431669	ZA	8005150		
US	4840012	AU	25844/88	CA	1330753	EP	319995
		JP	1167007	US	4869048	CA	1281628
		DE	3810554	GB	2206556	US	4790126
US	4627221	DE	3439020	EP	181466	JP	61104931
US	4813208	EP	252040	JP	63003938	SE	8602484
		SE	8602561				

END OF ANNEX